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Impact of Ethnic Markets on Food Accessibility in Lincoln, NE

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IMPACT OF ETHNIC MARKETS ON FOOD ACCESSIBILITY IN LINCOLN, NE

An Undergraduate Thesis

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Abstract

This study used availability surveys and demographic mapping to analyze the impact of ethnic grocery stores on food accessibility in Lincoln, Nebraska. Access to fresh, healthy foods has been shown to be an important factor in public health, one in which low-income and minority populations are more likely to experience barriers such as long distances to the nearest grocery store. A growing body of research has described ethnic markets as important sources of fresh, healthy food for vulnerable populations, but on the whole the contributions of ethnic markets are overlooked in policy and research. In addition, ethnic markets may face language and cultural barriers in civic participation processes, business licensing, and loan applications, reducing the structural support these businesses receive. For these reasons, understanding how ethnic markets affect food access in Lincoln has important implications for food policy and future research.

The study asked three main questions: how do ethnic grocery stores affect the availability of fresh fruit, fresh vegetables, dairy, and meat; where are ethnic and non-ethnic grocery stores located in relation to transit services; where are ethnic and non-ethnic grocery stores located in relation to minority and low-income populations. In-person surveys revealed that 60% of ethnic grocery stores stocked dairy products, 100% stocked meat, and 95% and 90% of ethnic grocery stores provided fresh vegetables and fresh fruit respectively. Mapping ethnic and non-ethnic grocery stores against transit services in ArcMap revealed that ethnic grocery stores are located in areas with denser concentrations of bus routes and bike paths. Including demographic data in the mapping process revealed that ethnic grocery stores are more frequently located near and among census tracts with higher diversity indexes, population densities, and population below the poverty level.

These results strongly suggest that ethnic markets in Lincoln are reliable sources of fresh produce, dairy, and meat to the communities they serve. Additionally, because of their proximity to transit services and dense minority and low-income populations, these markets likely serve an important role in providing access to healthy food for communities that are the most likely to lack it.

Introduction

The purpose of this study is to describe the impact ethnic grocery stores have on food accessibility in Lincoln, Nebraska. Access to fresh, healthy food is understood to be an important factor in public health, one that can be hampered by long, unwalkable distances to the nearest grocery store. Low income and minority populations are more likely to face food access issues. Despite their potential to provide fresh produce options for low income and minority populations, ethnic markets are often overlooked or underestimated in policy and research addressing food access. In addition, ethnic markets may face systemic barriers that make it difficult to operate in American cities. Understanding how ethnic markets impact food accessibility in Lincoln can inform policy and future research in order to highlight the contributions these markets make to food access and support their ability to do so in the future. Previous research informs this perspective on the food access paradigm and the ethnic market's place within it.

Background Information

Food accessibility has gained a lot of attention in recent years as a potentially important component of public health. The issue is often framed around the concept of a "food desert", a specific geographic area with limited access to fresh, healthy foods. Food-deprived areas have been shown to be related to negative health outcomes. Areas without supermarkets, for example, exhibit increased rates of obesity (Larson, 2009). A causal relationship has been hard to define, but a review of 38 food desert studies found moderate evidence supporting the assertion that a deprived food environment has a significant negative impact on health outcomes (Caspi et. al, 2012). The reasoning is: barriers to accessing healthy food like unwalkable distances and long travel times influence consumers to turn to more convenient food sources, namely fast-food restaurants and corner stores that sell calorie-dense food (Cavanaugh, 2013). Calorie-dense foods are generally fatty or sugary, as compared to nutrient-dense foods like vegetables, fruits and proteins that are generally healthier. Food deserts are most common in low-income, minority neighborhoods, and it is these neighborhoods specifically that have difficulty overcoming barriers to fresh, healthy food (Walker, et. al, 2010).

The USDA has made this issue a policy priority and developed the Food Access Research Atlas, a mapping tool that shows census tracts across the United States that are classified as food deserts (USDA, 2020). For the USDA classification, food deserts are defined for urban areas as census tracts in which 1) at least 50% of residents live farther than 1 mile away from the nearest supermarket and 2) the poverty rate is greater than or equal to 20% or 80% of families earn below the metropolitan median income. This is just one definition among many that are used to study food access, but it comes with serious drawbacks. Studies have shown that radial distance measurements do not accurately predict consumer behavior in food deserts. Other criteria are required, such as density of food options, transit and active transport options, perceived accessibility of consumers, affordability, and cultural acceptability (Caspi et. al, 2012, USDA, 2020, Dutko, 2012). A second limitation is that the definition focuses solely on supermarkets. Supermarkets are a cheap and reliable source of all kinds of food items, but they are far from the only contributors to a city's food environment. This framing of the food accessibility issue has influenced the discussion on policy solutions.

Proposed solutions to the food access problem generally come in one of two camps. First, policy makers campaign for the development of full-service grocery stores in identified food deserts (Bassford et al., 2010). A full-service grocery store is one that stocks fresh produce, lean meats, and dairy products in addition to dry goods. It is often difficult to convince large chains to locate in city centers where land values are high, however, and policy-maker's perception of what is considered a full-service grocery store can be narrow. As a second option, food activists often advocate for the development of community agriculture initiatives such as farmer's markets and collective gardening. These initiatives are certainly valuable, but studies have shown that they alone cannot ensure that healthy, affordable food is available year-round to residents that struggle with food accessibility (Allen, 1999). For one, prices at local food markets are typically higher than those found in grocery stores. The produce is also seasonal and sold within very small windows of time (Allen, 1999). Largely absent from the discussion of improving food access, however, are ethnic markets (Joassart-Marcelli et al., 2017).

Multiple studies have shown that ethnic markets can contribute meaningfully to a city's food environment by providing fresh produce in areas that are underserved by traditional supermarkets (Bukenya, 2018; Short, et al., 2007; Martin et al., 2014; Joassart-Marcelli et al., 2017). Ethnic markets are small grocery stores that stock foods that cater to a particular ethnic group, such as an Asian market or Indian grocery store. These markets are smaller and more versatile than supermarkets, often positioning themselves near or among neighborhoods as opposed to on the outskirts of town (Short et al., 2007). In some areas the availability of different kinds of healthy food in these grocery stores has been found to be equal to that of suburban supermarkets, with prices that match or undercut what can be found at the larger stores (Martin et al., 2014). Additionally, ethnic markets have been shown to have important social benefits to the communities they serve. Ethnic grocers have been known to offer small, interest-free loans to customers who may be struggling financially (Komakech, 2016). They also provide important social gathering spaces for immigrants, offering a comfortable place to shop and speak their own language (Komakech, 2016). These stores also offer opportunities for social mobility in disadvantaged minority communities, allowing immigrants to make a living for themselves and their families (Yang Liu, 2013).

Even with these advantages, ethnic markets can lack support from the cities they serve. Proprietors of ethnic markets face language and cultural barriers when applying for the permits necessary to operate their businesses (Komakech, 2016). Business owners often complain about the complex system of permits that cannot be navigated without professional help. Language and cultural barriers also make it difficult for proprietors of ethnic markets to participate in civic processes that shape the communities they live and operate in (Yang Liu, 2013). This can leave ethnic market owners out of the loop when it comes to redevelopment projects, which can result in the relocation of these businesses or even their closure (Komakech, 2016). Minority business owners also face discrimination when applying for small-business financing, further limiting their access to structural support (Bates T and Robb A, 2016). These issues extend to the realm of food policy. One study found that nearly all policy directives aimed at improving the food environment in Toronto were focused on supermarkets and other big-name development, leaving ethnic markets to fend for themselves (Donald and Blay-Palmer, 2006). Even in studies that look specifically at food access, ethnic grocery stores are often lumped in with low-access institutions such as convenience stores and gas stations despite exhibiting better selection of produce and affordability (Joassart-Marcelli et al., 2017).

There is a need to investigate the role of ethnic markets in urban food environments. There are few studies that seek to understand the impact of ethnic markets on food accessibility, and those that exist are largely place-based, meaning their results cannot be meaningfully extrapolated to other cities. In Lincoln, Nebraska, very little literature exists on food access. The USDA mapping tool described above gives a facile description of food deserts in the area based on income level and distance to the nearest supermarket. A previous undergraduate thesis expanded on this research by mapping all grocery stores in Lincoln, making no distinction between large supermarkets and neighborhood grocery stores (Corr, 2015). A more nuanced description of the food environment in Lincoln is needed to inform policy interventions aimed at improving food access. Given their potential for providing healthy and culturally appropriate food to low-income minority populations and their relative lack of structural support, research aimed specifically at ethnic markets in Lincoln would be an important step forward in understanding the issue.

Literature Review

Returning to the purpose of this study: how do ethnic markets affect food accessibility in Lincoln, Nebraska? To guide our approach to this question four studies have been analyzed that examine the impact of ethnic markets and small grocery stores in different cities. The first study conducted by Bukenya in Huntsville, Alabama analyzed ethnic grocery stores, specialty food stores, convenience stores, and drug stores in the area for their impact on the food environment (Bukenya, 2018). Although all of these stores contributed to the food environment in some way, only the ethnic store and the specialty store supplied healthy food options as defined by the US Department of Agriculture. The author used this benchmark to measure the availability of healthy food in the study area and performed a radial buffer analysis to analyze the impact the ethnic and specialty store had on food availability. A radial buffer analysis in this case designates all the area within a certain distance of the point of interest as food-accessible. The Bukenya study used a 0.5 mile buffer. While 0.25 miles is typically used to designate a walkable distance in US transportation literature, the median length for walking trips is measured at 0.5 miles (Yang & Diez-Roux, 2012), lending credence to this value.

The second study analyzed the impacts of small, medium, and large grocery stores in Hartford, Connecticut (Martin, et al., 2014). First, total accessibility of the food network was analyzed by using a network analysis in ArcGIS. This approach measured distances by road network, rather than “as the crow flies”, which the study claims is a better approximation for human travel. In addition to distance measures the Hartford study looked at a number of store features including exterior appearance, produce quality, and affordability of food items to give a more complete look at the food environment these stores were creating. Produce quality was measured via survey conducted by the researchers wherein they would rate the produce at each location based on soft spots, number that were overripe, and other variables on a scale of 1 to 4. Affordability was measured using the price of a “market basket” of goods. A market basket is a list of goods a typical family would purchase regularly, and is often used in calculations for cost of living. The study compared the cost of a market basket from larger stores to those of smaller stores to define affordability. No measurement was given for the availability of fresh produce at the different locations.

The third study looked at small-scale food retailers in three neighborhoods in the San Francisco Bay Area (Short et al., 2007). This study examined five aspects of grocery stores to understand how they contributed to food accessibility. These were distance, affordability, nutritional adequacy, cultural accessibility, and quality. Distance was measured by mapping locations of small grocers across the study area with no buffer or network analysis involved. To measure affordability this study took the market basket approach and conducted price surveys with one important difference. The researchers used "culturally acceptable" substitutions to adapt the standard "American" market basket for foods that would be appropriate for Latin American populations and other ethnic groups. Nutritional adequacy was measured by comparing the food available at the markets to the Thrifty Food Plan (TFP). The TFP outlines necessary dietary inputs for adequate nutrition as defined by the USDA. Cultural acceptability was measured by the presence of Latin American food as well as the use of the Spanish language in advertisements and business interactions. Quality was measured using a 5-point Likert scale similar to the apparatus used in the Hartford study. Finally, interviews were conducted with the storeowners about business practices, relations with customers, and challenges the store faced.

The final paper studied ethnic markets in City Heights, a low-income neighborhood in San Diego with a particularly diverse immigrant population (Joassart-Marcelli et al.,2017). The researchers examined three aspects of the food environment created by ethnic markets: accessibility, affordability, and cultural acceptability. Accessibility was measured by mapping the locations of the ethnic markets in the area and then performing a buffer analysis. Rather than radial distance or road path, however, the buffer used was a 5-minute walk and a 10-minute walk from the store. It is unclear exactly how this was calculated. Built into their accessibility measure was the availability of fresh food at these stores. To calculate availability the researchers performed an inventory survey, counting what percent of the markets provided fresh fruit, fresh vegetables, canned fruits, canned vegetables, and so on. They also calculated the average variety in each of these categories and several other case-specific qualifiers such as organic options for fruits and vegetables. Ultimately the researchers compared this data to the data they collected in the same manner on non-ethnic grocery stores, as their main goal was to demonstrate the unique potential ethnic markets have for improving the food environment. For the affordability factor, the researchers compared the price per serving of common food items of ethnic stores to those of non-ethnic stores and the national average price per serving. They also recorded participation in Electronic Benefit Transfer (EBT) which allows SNAP recipients to use their food vouchers. SNAP stands for the Supplemental Nutrition Assistance Program, commonly referred to as food stamps, which is a food voucher system distributed based on income. Also recorded was WIC participation, which is similar to EBT but directed toward women, infants, and children up to age 5. To measure cultural acceptability, the researchers used Census information to plot where the concentrations of certain minority populations resided in the neighborhood and then compared these concentrations to the location of ethnic markets that catered to that minority. There does not appear to be a sophisticated analysis of this relationship, but the researchers report higher concentrations of the ethnicities around the markets serve around them.

While these studies provide crucial context for researching the impact of ethnic grocery stores, they also leave some gaps in their analysis. For one, none of the studies examined the differences between the location of ethnic grocery stores and non-ethnic grocery stores at a meaningful scale. If, compared to non-ethnic grocery stores, ethnic grocery stores are more concentrated among certain populations such as low income or minority communities, then that

provides information about who these stores are more able to serve and what role they are playing in the city's food environment. Additionally, none of the studies incorporate transit services into their analysis, which may be important factors for people deprived of reliable personal vehicles.

Research Questions

Utilizing the research on food access and ethnic markets' relationship to it, the following research questions were developed for the study:

- How do ethnic markets affect the availability of fresh produce, dairy, and meat in Lincoln?
- Where are ethnic and non-ethnic grocery stores in Lincoln located in relation to transit services?
- Where are ethnic and non-ethnic grocery stores in Lincoln located in relation to minority and low-income populations?

The available literature describes food accessibility as a significant component of public health. Ethnic markets are an often-overlooked component of a city's food environment and their contributions to food accessibility merit further study. This thesis will use previous approaches to studying ethnic markets to design a method to describe how they affect food accessibility in Lincoln, Nebraska.

Methods

This study utilized in-person surveys and mapping techniques to describe the impact of ethnic markets on food accessibility in Lincoln, NE. The first step was to identify ethnic markets in the study area, which is defined as the Lincoln city limits. Google Maps was used to identify all possible grocery stores in the study area and from this set all ethnic markets were identified. Ethnic markets are defined as grocery stores that cater to a specific ethnic group, so many of the markets can be identified by name alone, as they specifically denote what group they cater to. Examples include Suji's Indian Grocery Store or the Oriental Market. Any unclear grocery stores were be surveyed in person and the researcher determined if the inventory is specific enough to qualify the grocery store as "ethnic." There were no ambiguous cases in the sample, and the total sample size is 21 ethnic markets.

To study the availability of healthy food an inventory survey was conducted. The survey recorded the amount of varieties of fresh fruit, fresh vegetables, dairy products, and meat available at each ethnic grocery store. As a descriptive example, if a store provided white onions, red onions, and shallots, the survey recorded them as three different varieties of fresh vegetables. Availability was described by three categories: "none available", denoting that no varieties of the chosen category were stocked at the grocery store; "some availability", denoting that less than 10 varieties of the chosen category were stocked; and "high availability", denoting that 10 or more varieties of the chosen category were stocked at the grocery store. The 10 variety split for "some availability" and "high availability" is somewhat arbitrary, but is important to differentiate between stores that stock the bare minimum of produce and those that provide significant

variety. While less descriptive than the survey used in the Joassart-Marcelli study, this approach will give baseline availability information for the stores. This can be used to show if there are any spatial disparities in access to certain foods and to dispel negative perceptions about the availability of produce at ethnic grocery stores. Permission to conduct the survey was requested from grocery store owners and granted without exception.

The survey also recorded participation in EBT and the SNAP program, an approach mirrored by the Joassart-Marcelli study. EBT participation is an important factor for low-income communities who may rely on SNAP benefits, and in the absence of other price indexes this at least provides some assurance that ethnic grocery stores are useful to low income populations. An affordability measure was not included in this study as the logistics and analysis proved to be to cumbersome for the scope of the project.

Finally, spatial analyses of ethnic and non-ethnic markets were conducted in order to create descriptive maps of the study area. ArcGIS software was used to plot the location of the markets in Lincoln. Information by census tract and block group for race/ethnicity, poverty level and population level was sourced from the ESRI Living Atlas Project, a public resource that uses the most recent Census information to create layers and shapefiles for research. Information on transit services was sourced from open GIS files provided by the city of Lincoln on their website. A radial buffer analysis was performed using ArcMap to approximate walkability and access around the ethnic grocery stores. Although radial buffer analyses are a relatively unsophisticated way to examine walkability and access, they provide a baseline understanding of how these grocery stores interact with their environments (Bukenya, 2018). A complete list of maps is located in the Results section.

Results

The following tables and maps present the results of the study. These are organized by which research question they primarily answer.

How Do Ethnic Markets Affect Availability of Fresh Produce, Dairy, and Meat in Lincoln?

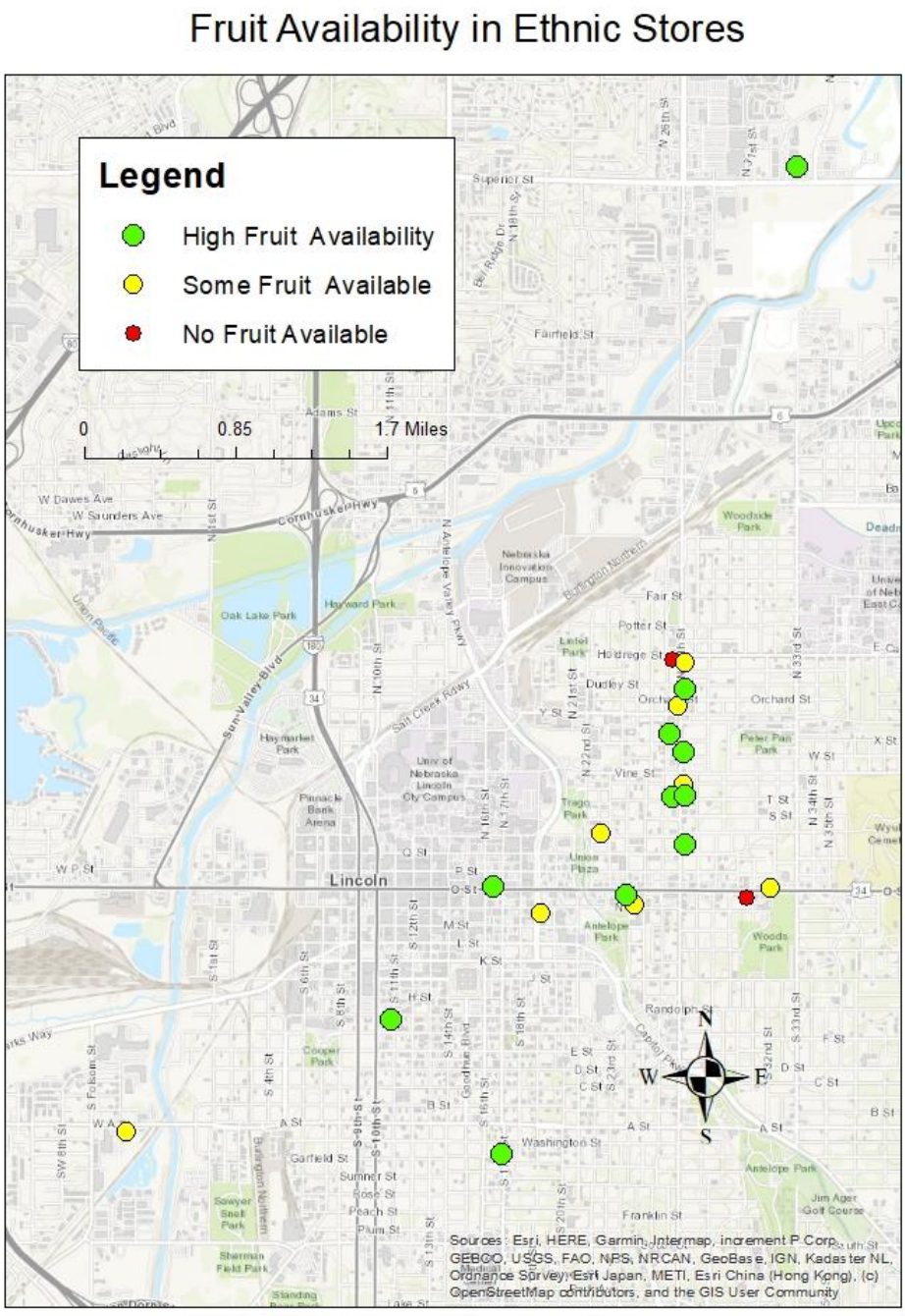
Table 1: Availability of Fresh Fruit, Fresh Vegetable, Dairy, and Meat at Lincoln Ethnic Grocery Stores

Type/Availability		None Available	Less than 10 Varieties	10 or more Varieties
Fresh Fruit	No.	2	8	11
	percent	9.5%	38.1%	52.4%
Fresh Vegetables	No.	1	3	17
	percent	4.8%	14.3%	81.0%
Dairy	No.	8	5	8
	percent	38.1%	23.8%	38.1%
Meat	No.	0	3	18
	percent	0.0%	14.3%	85.7%

The table shows the amount and percentages of ethnic grocery stores in each availability category for fresh fruit, fresh vegetables, dairy, and meat. Fresh fruit was available in 10 or more varieties at 11 out of 21 ethnic grocery stores and available in fewer than 10 varieties at 8 ethnic grocery stores. Two stores in the sample stocked no fruit. Fresh vegetables were more frequently available, with 17 stores or 81% of the sample stocking 10 or more varieties. Three stores stocked fewer than 10 varieties and 1 store stocked no vegetables at all. Dairy was the most variable food category in the sample. Eight stores stocked greater than 10 varieties of dairy products, 5 stocked fewer than 10, and 8 stores stocked no dairy products at all. This is not expected to have a significant impact on food access because, unlike produce, dairy is not a crucial dietary component. For meat, three stores stocked fewer than 10 varieties and 18 stocked greater than 10. Every store in the sample stocked at least some meat products. Frozen meats were included in these numbers.

The survey revealed that 20 out of 21 ethnic grocery stores accepted EBT.

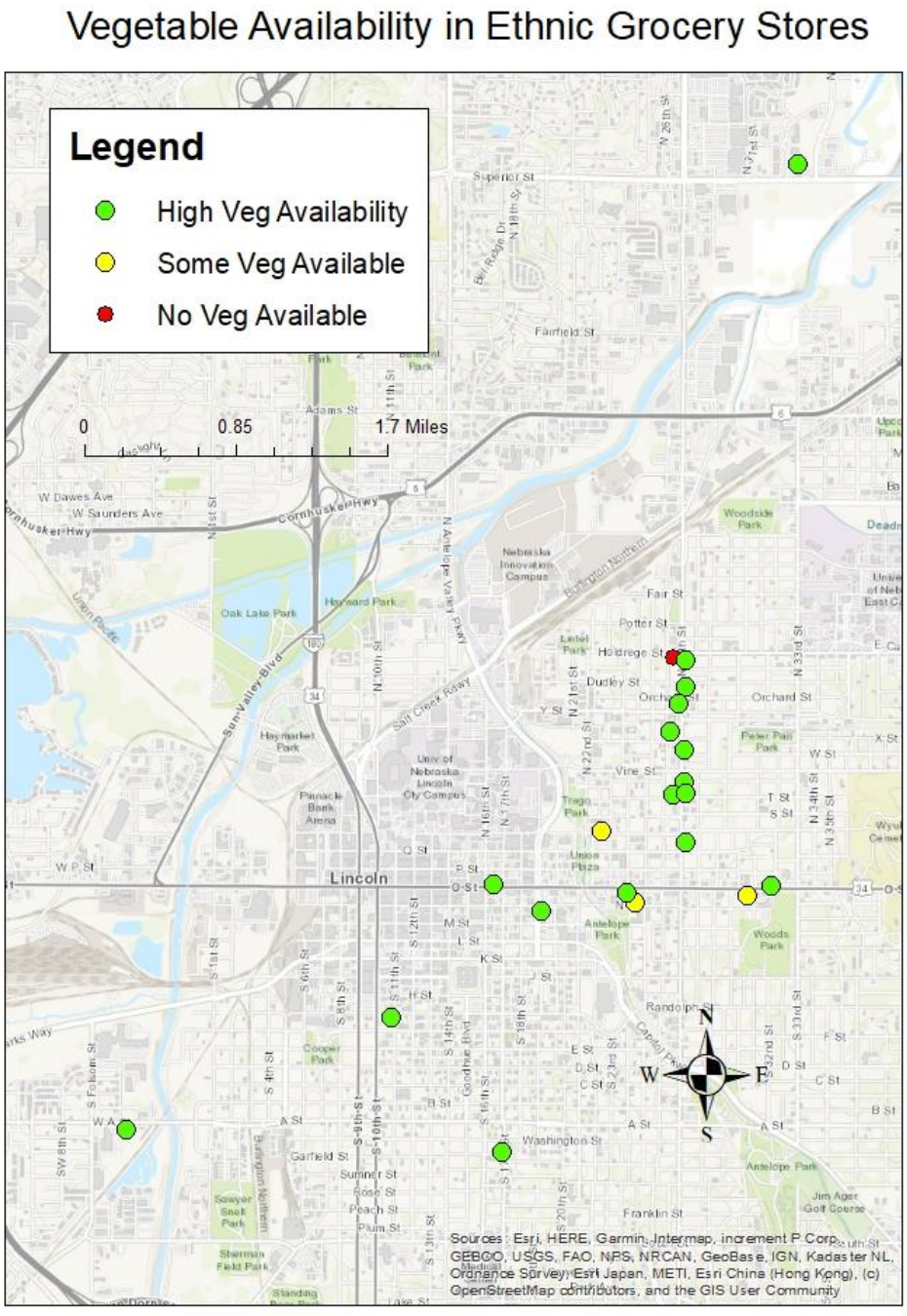
Map 1: Fruit Availability in Ethnic Stores



Map by Connor McFayden

Map 1 shows the distribution of ethnic grocery stores and their availability of fresh fruit. “Some Fruit Available” indicated fewer than 10 varieties were available, while “High Fruit Availability” indicated that 10 or more varieties were stocked.

Map 2: Vegetable Availability in Ethnic Stores



Map by Connor McFayden

Map 2 shows the distribution of ethnic stores and their availability of fresh vegetables. “Some Veg Available” indicates that fewer than 10 varieties were offered while “High Veg Availability” indicates that 10 or more varieties were offered.

Figure 3: Dairy Availability in Ethnic Stores

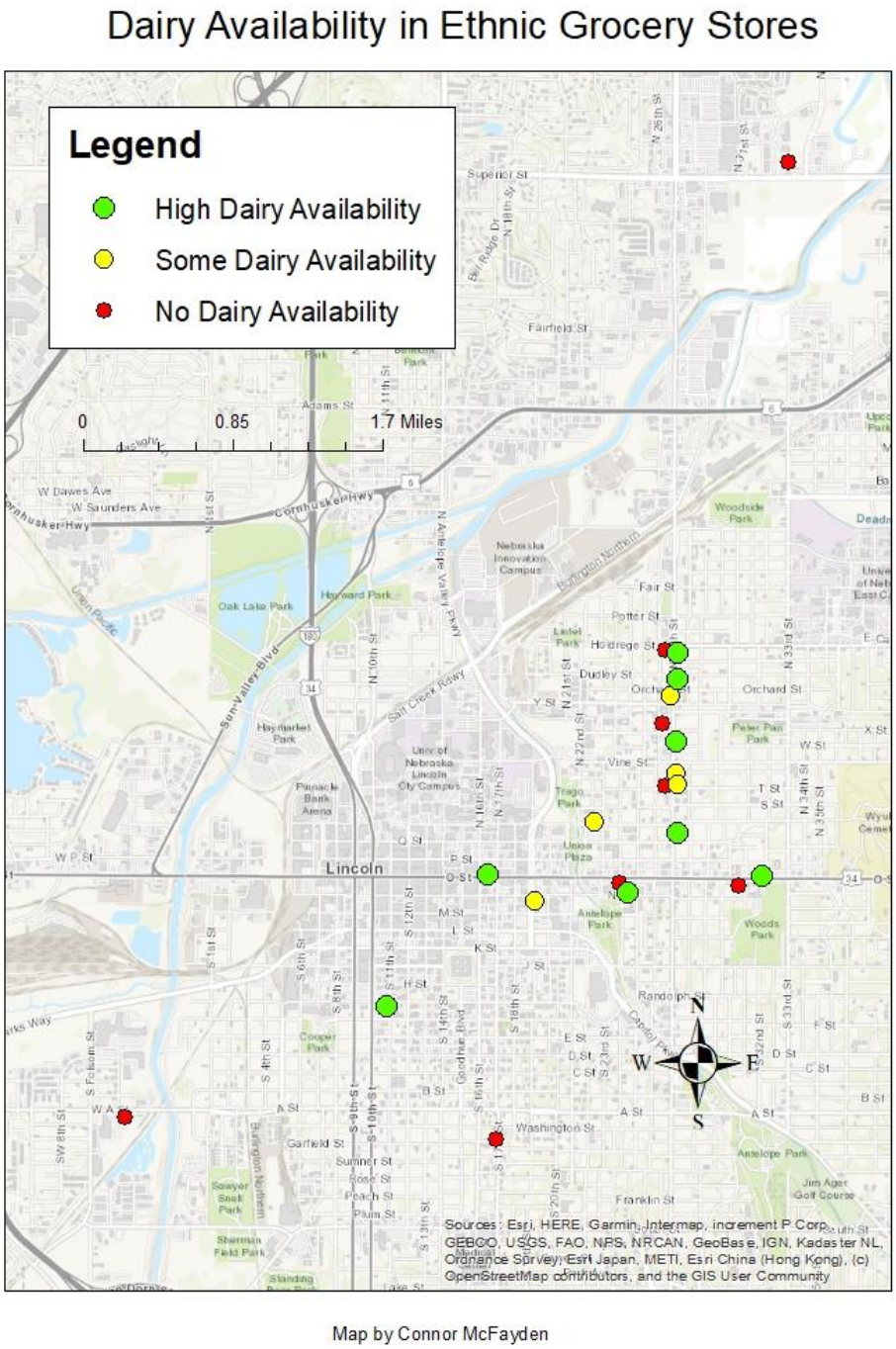


Figure 3 shows the distribution of ethnic grocery stores and their availability of dairy products. "Some Dairy Availability" indicates that fewer than 10 varieties of dairy products were available with "High Dairy Availability" indicates that 10 or more varieties of dairy products were available.

Figure 4: Meat Availability in Ethnic Grocery Stores

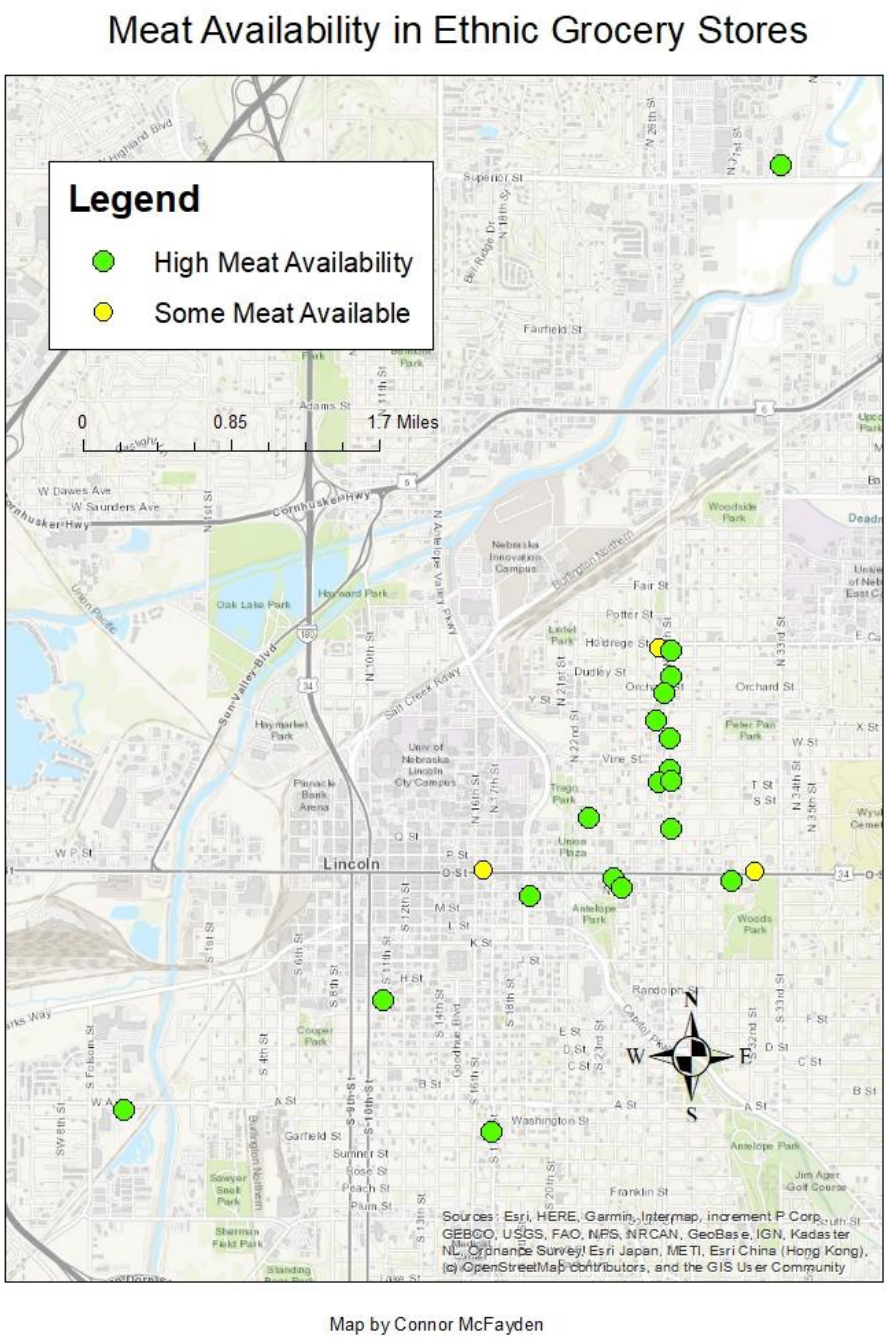


Figure 4 shows the distribution of ethnic markets and their availability of meat products. “Some Meat Available” indicates that fewer than 10 varieties of fresh, frozen, or canned meat products were available at the store while “High Meat Availability” indicates that 10 or greater varieties were stocked.

Where are Ethnic and Non-ethnic Grocery Stores Located in Relation to Transit Services?

Figure 4: Grocery Stores by Type

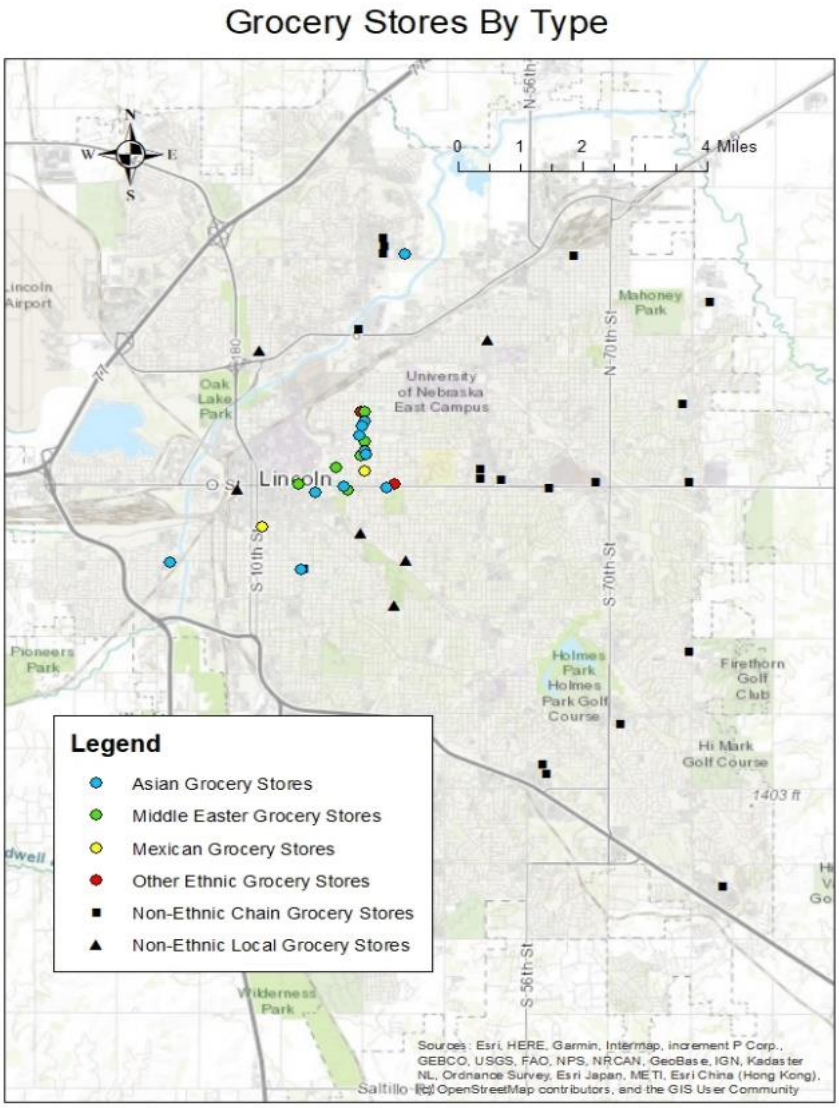
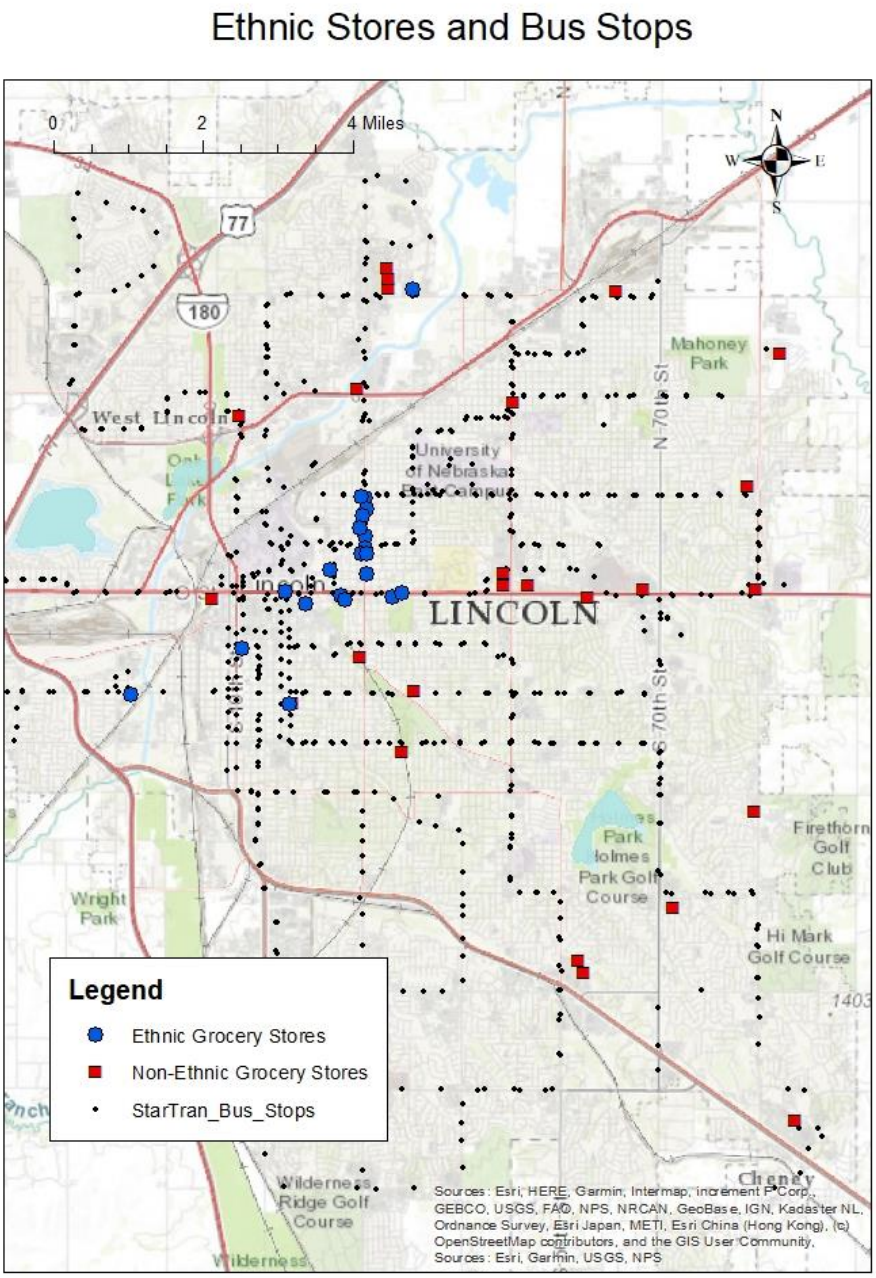


Figure 4 shows the distribution of different types of grocery stores in Lincoln. Ethnic grocery stores are the circles color-coded by the ethnicity they serve. The majority of these stores are described as either Asian or Middle Eastern markets. These stores are concentrated in the middle of Lincoln, especially around the 27th and O street corridors. Non ethnic grocery stores are more dispersed through Lincoln, especially chain stores which appear to avoid the center of the city in favor of the outer districts.

Figure 5: Ethnic Grocery Stores and Bus Stops



Made by Connor McFayden

Figure 5 shows the proximity of ethnic and non-ethnic grocery stores to StarTran Bus Stops. The concentration of ethnic grocery stores in the middle of the city corresponds with a denser area of bus stops. Most non-ethnic grocery stores, despite being more spread out, are located along at least one bus route.

Figure 6: Ethnic stores and Trails/On Street Bike Routes

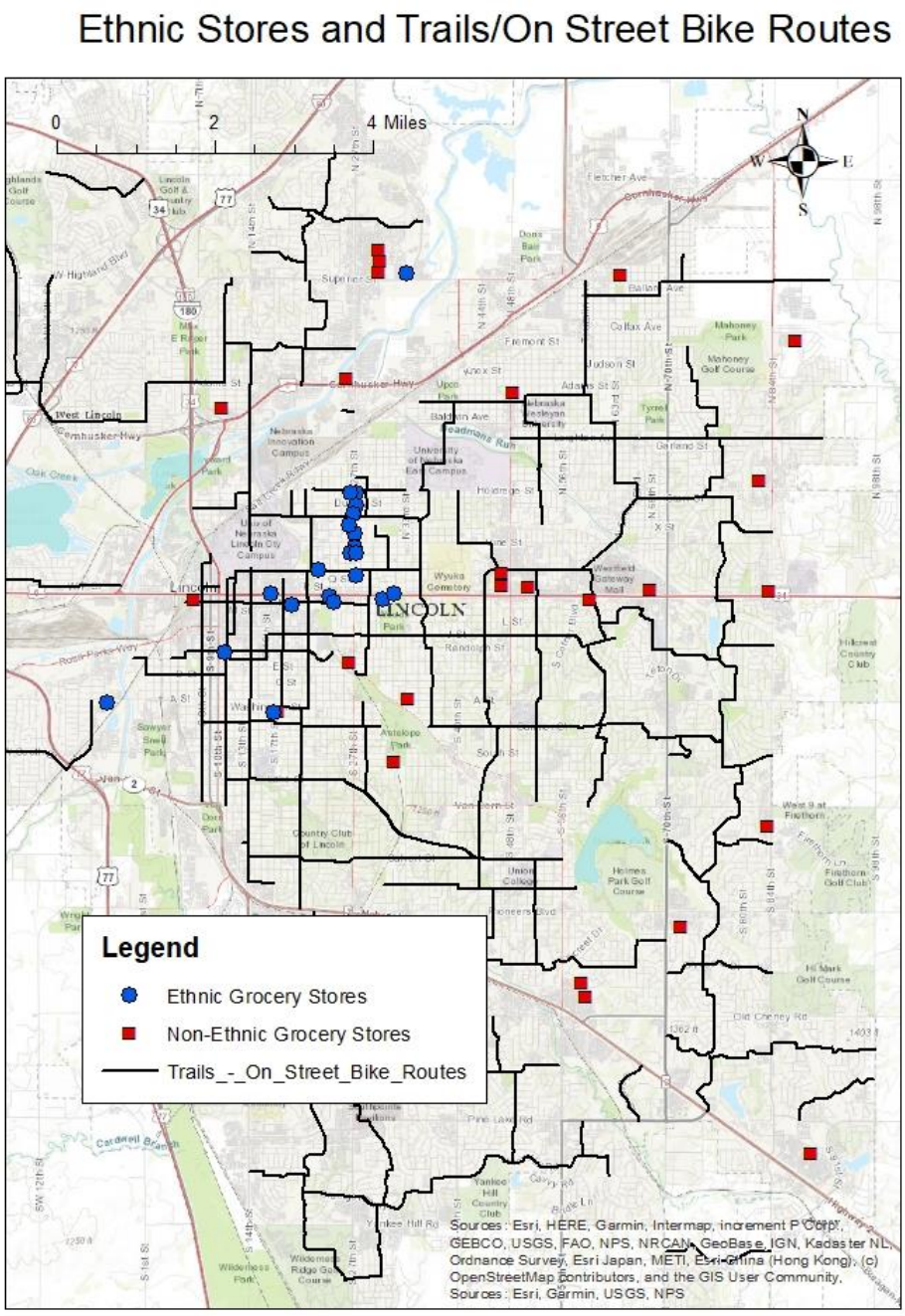
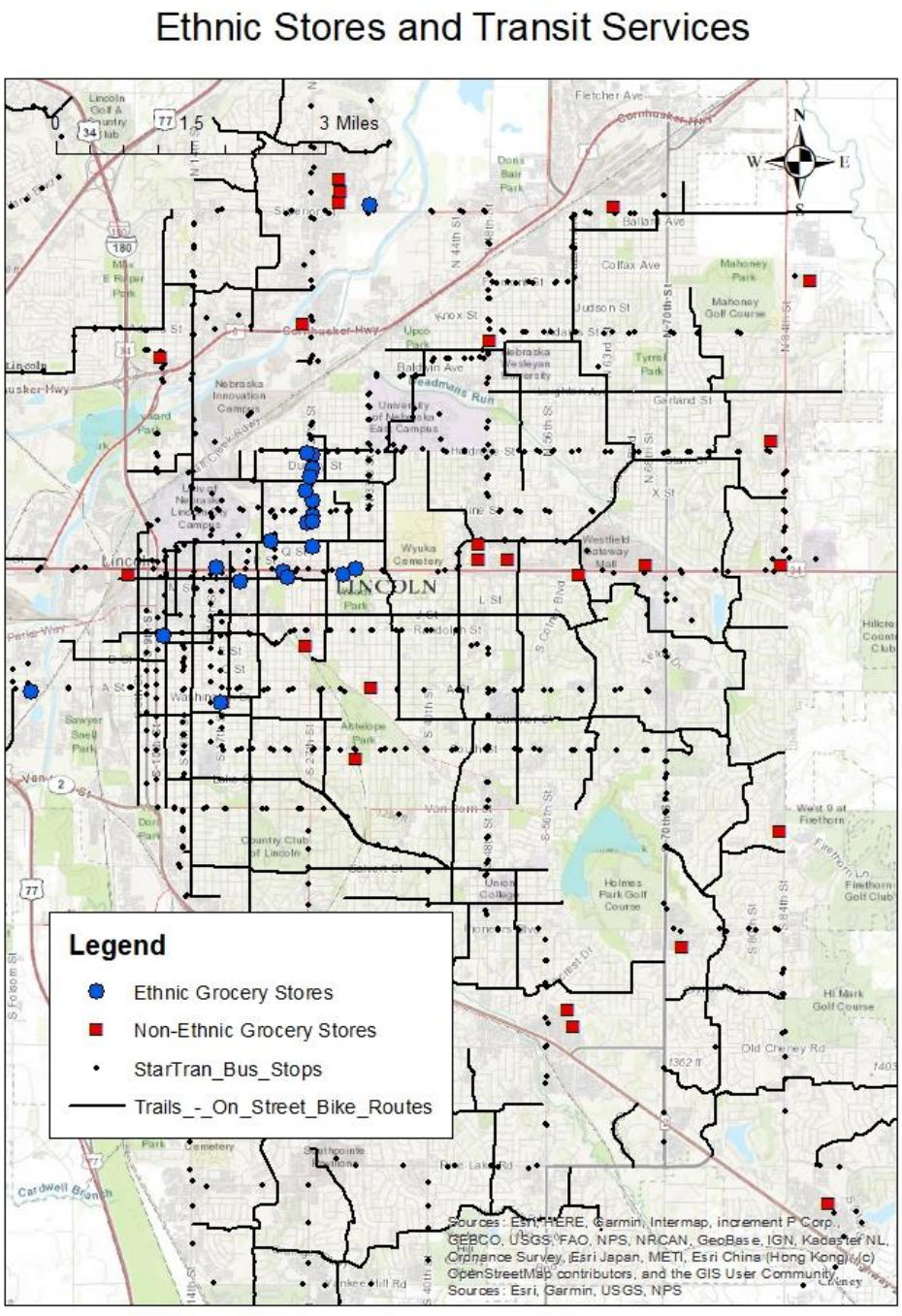


Figure 6 shows the proximity of ethnic and non-ethnic grocery stores to trails and on-street bike routes. The area where most ethnic grocery stores are located appears to be denser with bike routes than the rest of the city. Most non-ethnic grocery stores do not appear to be connected to trails or on street bike routes.

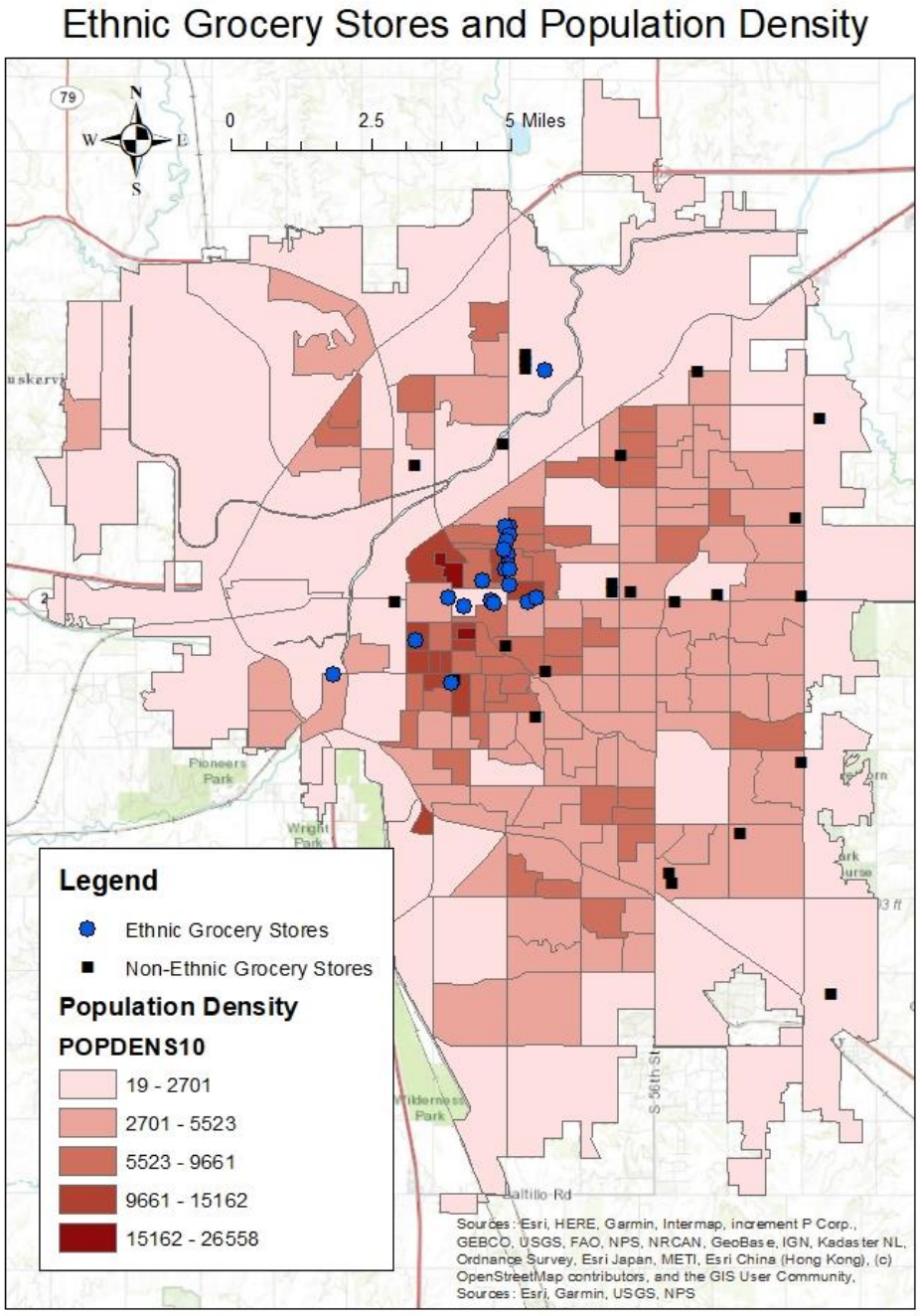
Figure 7: Ethnic Grocery Stores and Transit Services



Made by Connor McFayden

Figure 7 combines figures 5 and 6 to show how ethnic and non-ethnic grocery stores fit into the broad system of transit services in Lincoln. Ethnic stores are located in areas with the densest concentration of transit services.

Figure 8: Ethnic Grocery Stores and Population Density



Made by Connor McFayden

Figure 8 shows ethnic and non-ethnic grocery stores in relation to population density demographics. Ethnic grocery stores tend to be concentrated in or near areas with higher population densities than non-ethnic grocery stores.

Where Are Ethnic and Non-ethnic Grocery Stores in Lincoln Located in Relation to Minority and Low-Income Populations?

Figure 9: Ethnic Grocery Stores and Poverty Level

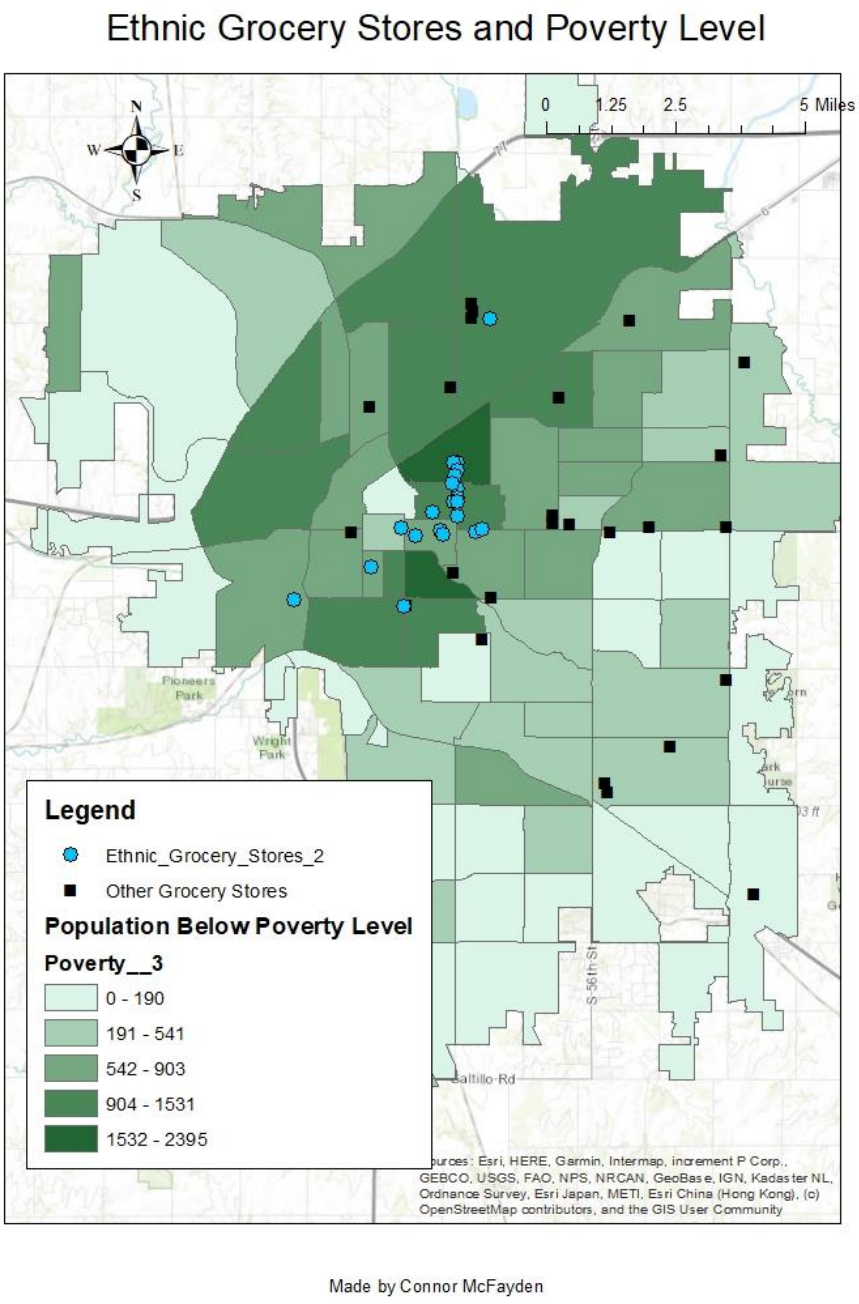


Figure 9 shows ethnic and non-ethnic grocery stores in relation to the population below the poverty level. Ethnic grocery stores are concentrated in or near those census tracts with high populations of people below the poverty level to a greater extent than non-ethnic grocery stores, which are more dispersed across the city.

Figure 10:

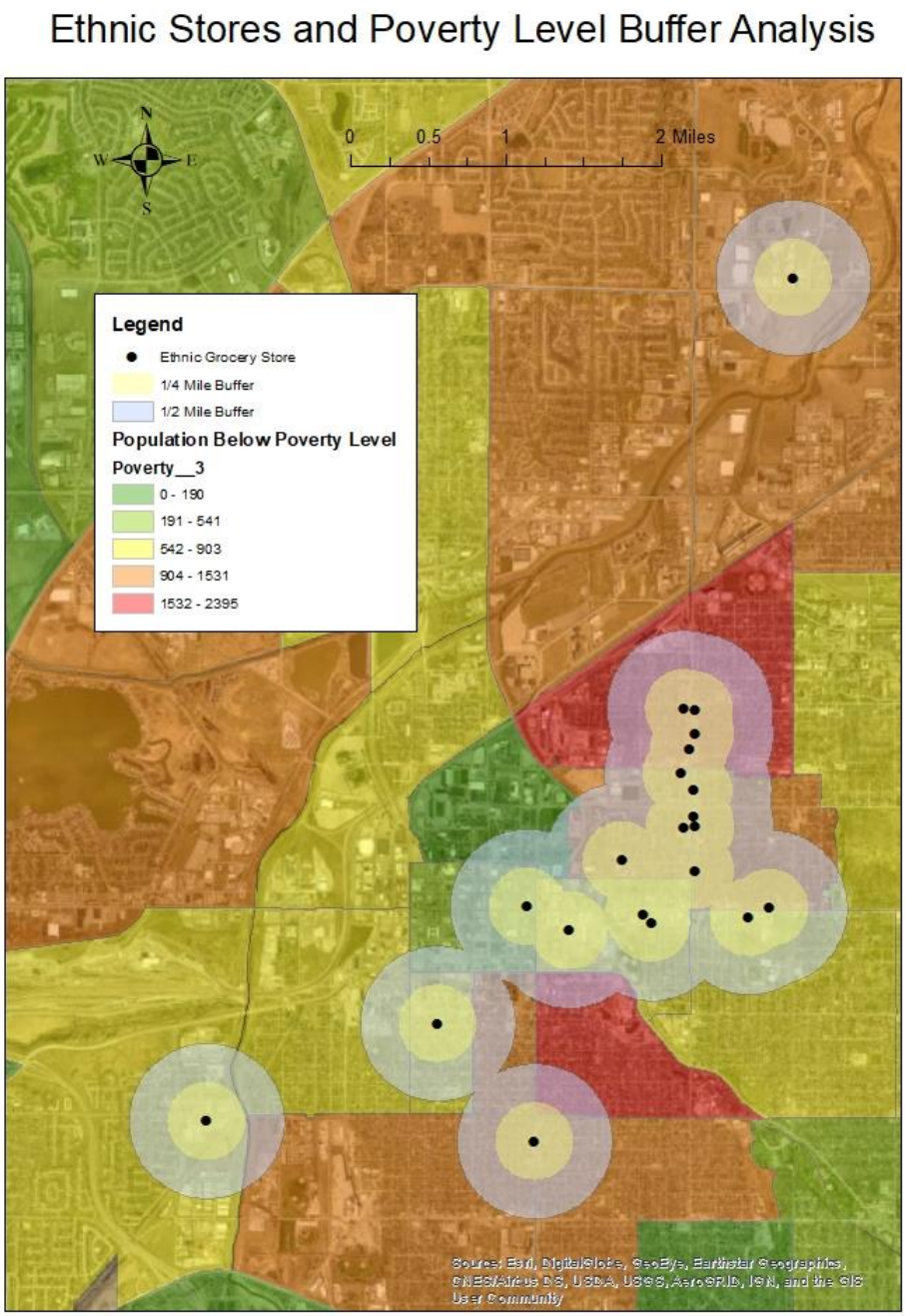


Figure 10 shows the radial buffer analysis of ethnic grocery stores against the population below the poverty level. While not a perfect approximation of walkability, the buffer analysis shows what distance is generally considered walkable in transportation literature and how these areas overlap with populations below the poverty line.

Figure 11: Ethnic Grocery Stores and Diversity

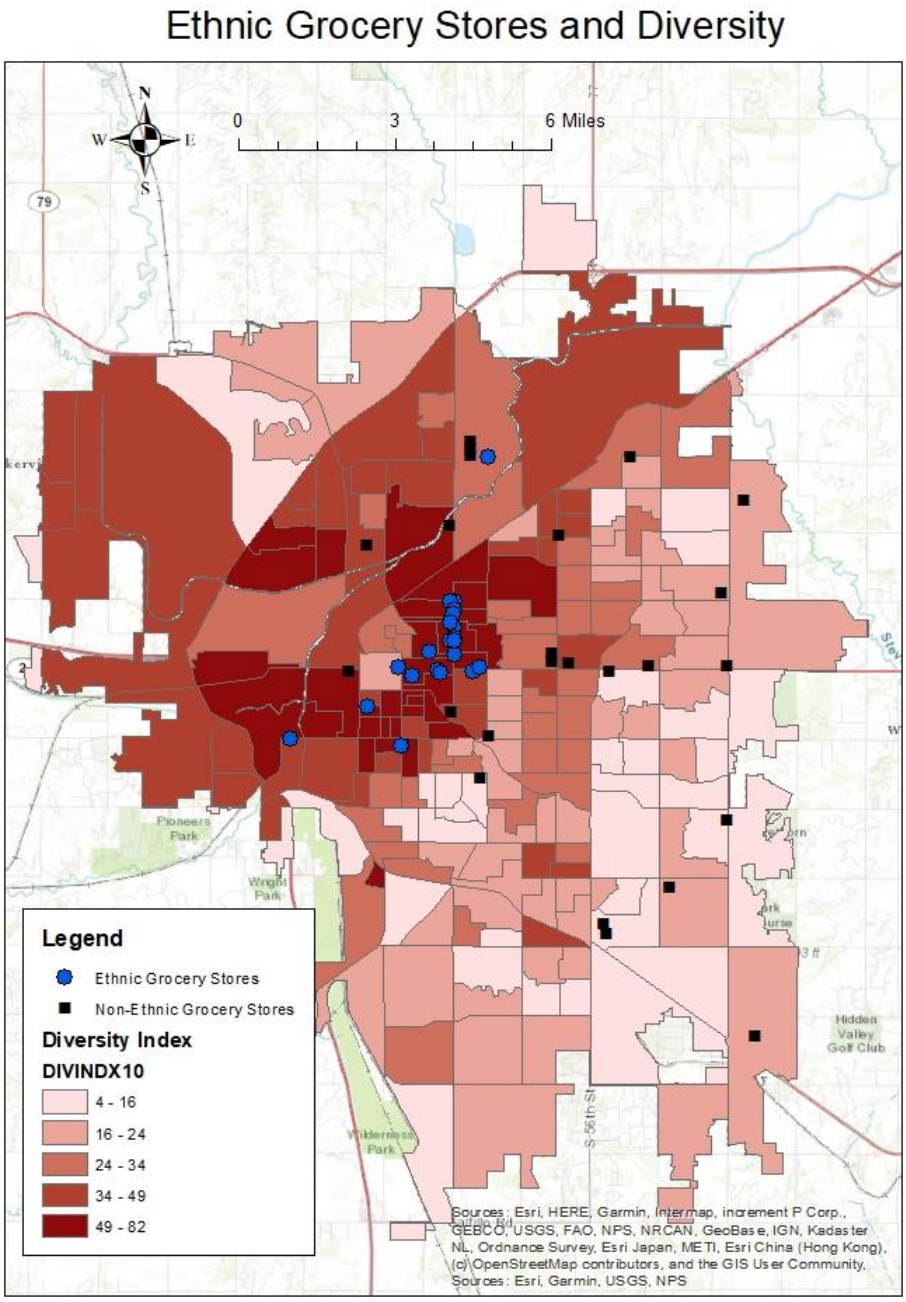


Figure 11 shows the distribution of ethnic and non-ethnic grocery stores in relation to the US census diversity index. The index displays the probability that two individuals in a given census block tract are of a different race. The map clearly shows that ethnic grocery stores are much more concentrated in the most diverse part of Lincoln compared to non-ethnic grocery stores.

Figure 12: Asian Grocery Stores and Asian Population

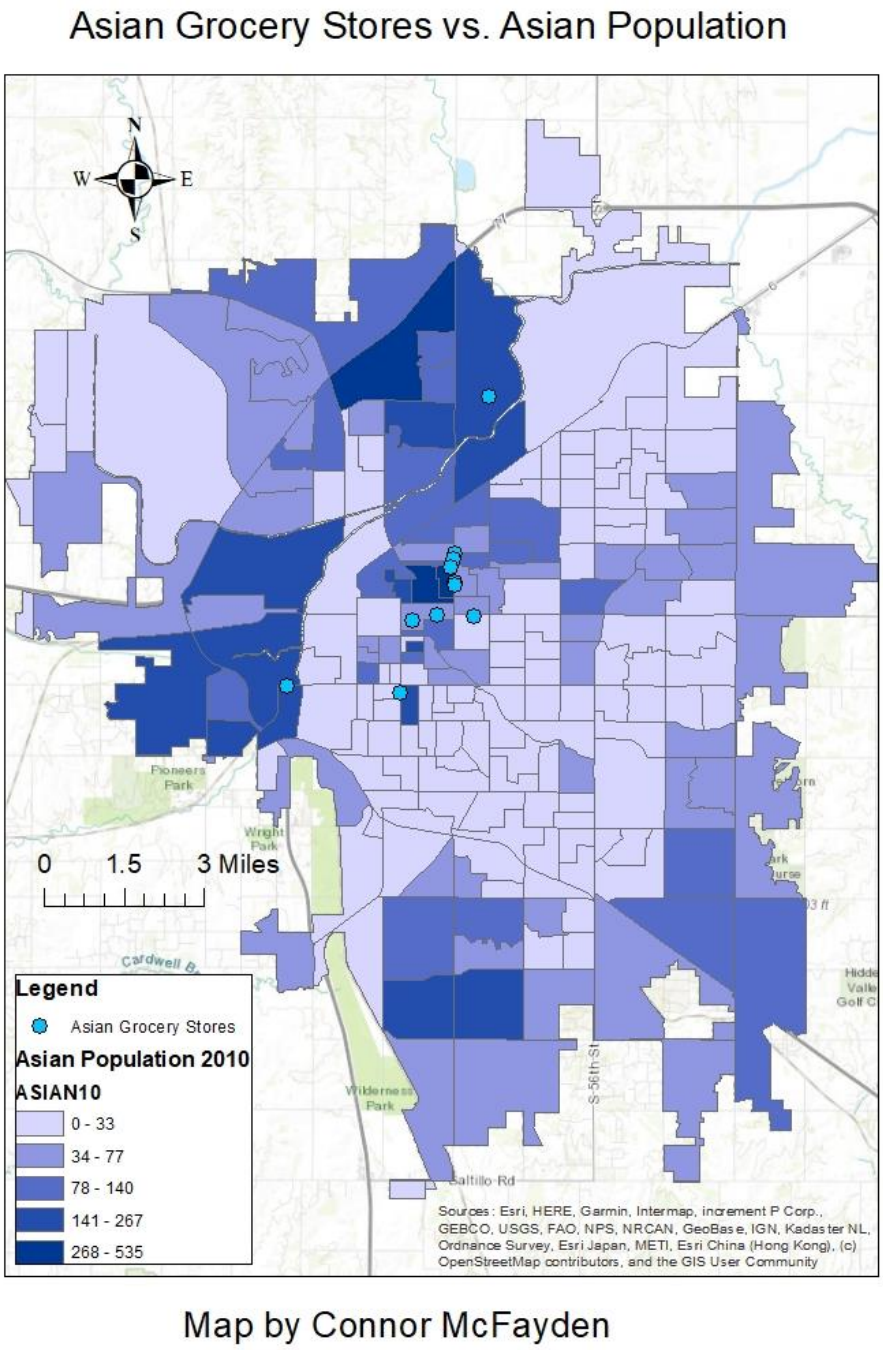


Figure 12 shows Asian grocery stores in Lincoln compared to the Asian population. Asian grocery stores appear to be located near areas with larger populations of Asian people, though there are multiple tracts with high populations that are not served at all.

Figure 13: Hispanic Grocery Stores and Hispanic Population

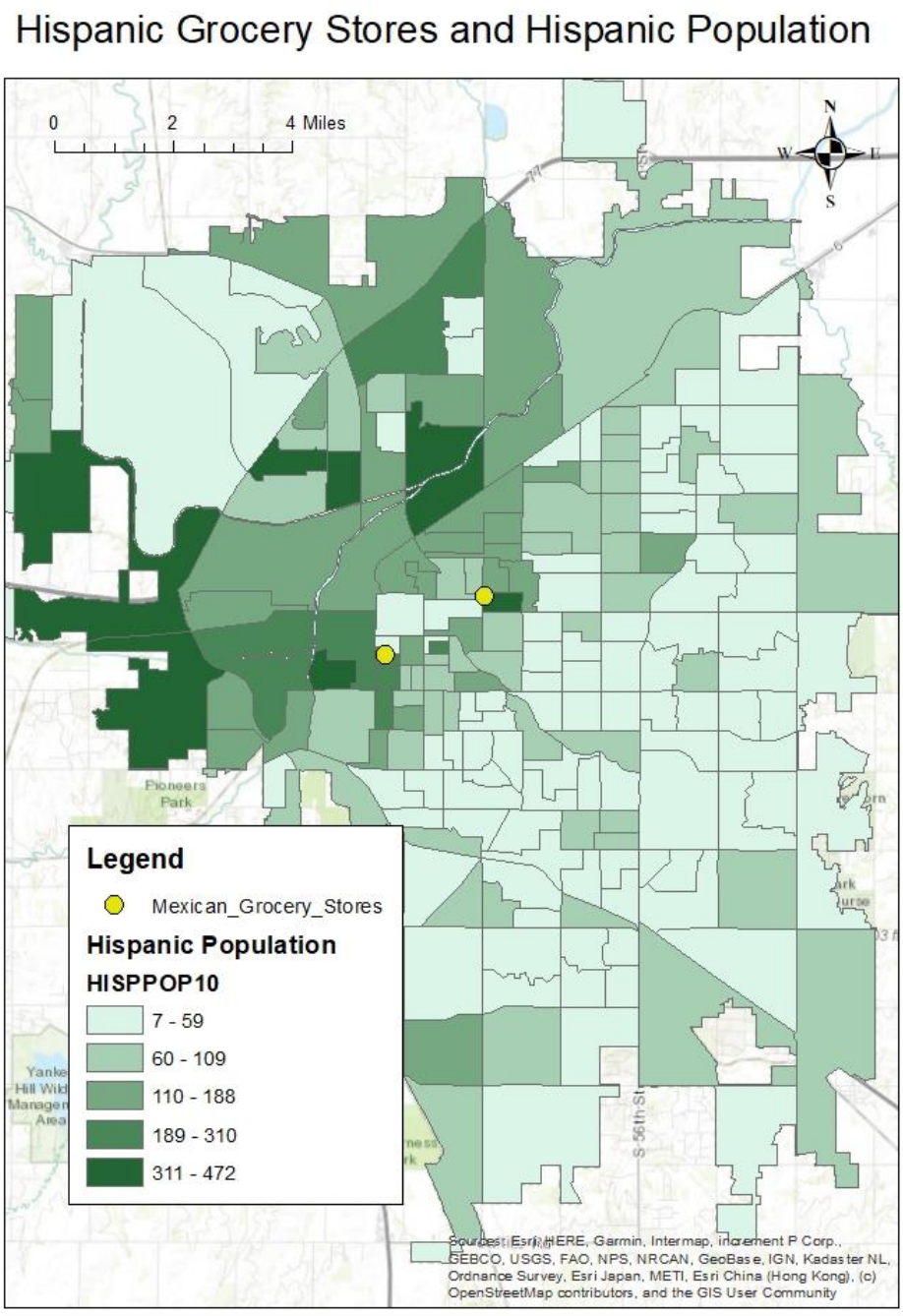


Figure 13 shows the distribution of Hispanic grocery stores in relation to the Hispanic population in Lincoln. There are few data points to compare, but the two stores that operate are located near higher populations of Hispanic people.

Discussion

How Do Ethnic Grocery Stores Affect Availability of Food?

The results showed that the majority of ethnic grocery stores in Lincoln can be good sources of fresh produce. Out of the 21 stores sampled, only 1 store did not stock any fresh vegetables and 17 stocked 10 or more varieties. Fruit was somewhat more scarce, with 2 stores lacking any stock and 11 out of 21 (52%) stocking 10 or more varieties. One possible explanation is that fruits are more difficult to stock than some vegetables like onions and potatoes because they require refrigeration, but the reason could also be that consumers at ethnic markets are simply less interested in fruit. It was the case in several Asian markets that more than 50 varieties of refrigerated vegetables were available while less than 10 varieties of fruit were stocked.

Compared to the results of the Joassart-Marcelli study, ethnic grocery stores in Lincoln exhibited greater availability of produce than those in City Heights. In the City Heights community 62% of stores stocked fresh vegetables, while 95% stocked at least a few varieties in Lincoln. Additionally, 90% of stores in Lincoln stocked fruit while only 65% stocked fruit in the Joassart-Marcelli study. Interestingly, that study did not show a significant difference in the availability of fruit and vegetables. One limitation of the data is the effect of timing on produce availability. Several proprietors mentioned that availability of produce fluctuates throughout the week or month, so the one-time survey conducted at each site may not be totally representative of long-term availability.

This evidence should dispel any negative perceptions of ethnic grocery stores as inherently unhealthy. It also shows that these stores are able to make meaningful, healthful contributions to food access in the communities they serve. If Lincoln were to pursue public health initiatives aimed at increasing consumption of fresh fruits and vegetables, these ethnic markets would be prepared to support and promote those initiatives. Figures 1 & 2 also show that availability of this produce is spread throughout the range of ethnic markets, so there are no spatial disparities in access on that scale.

Although dairy and meat are less critical to a complete nutritional diet, they can be important cultural components of diet. Dairy products were the least available food product in the study, with 8 out of 21 stores (38%) stocking no varieties at all. Availability numbers for dairy were lower than the Joassart-Marcelli study as well, with 80% of stores stocking products in City Height and only 60% stocking them in Lincoln. It may be that patrons of ethnic markets in Lincoln simply have a lower demand for dairy products or some other cause, but this is not necessarily a pressing issue. Meat was the most available food, with every store stocking at least a few varieties and 18 stocking 10 or more. This was a large departure from the Joassart-Marcelli study in which only 57% of stores stocked meat products. There were no spatial disparities to speak of in access to meat or dairy.

20 out of 21 stores participated in EBT and therefore invite SNAP beneficiaries. In the absence of a price index and affordability analysis, this shows that ethnic grocery stores are at least baseline supportive of low-income persons.

Where Are Ethnic and Non-Ethnic Grocery Stores Located in Relation to Transit Services?

Figure 4 shows an interesting distribution of ethnic versus non-ethnic grocery stores in Lincoln, with a clear concentration along the 27th street and O street corridors. Most ethnic grocery stores in Lincoln are located in this particular area in the middle of town with a few exceptions. Non-ethnic grocery stores, on the other hand, avoid the center and are instead dispersed towards north, east, and southeast Lincoln. As far as type, the majority of ethnic grocery stores in Lincoln are described as either Asian or Middle Eastern, with only 4 out of 21 stores not fitting into these categories. Despite a significant Hispanic population, there are only two Hispanic markets. This may be because traditional grocery stores stock many of the culture-specific Hispanic goods, or there could simply be less demand for these products in Lincoln, or some other explanation may be possible.

In relation to bus stops, the concentration of ethnic markets is located within an area that has dense bus infrastructure. Figure 5 shows how many routes overlap in that area and make it difficult to distinguish routes from each other. This is good news for commuters, who clearly have multiple options if they are making a trip to one of these ethnic markets. Though not the focus of this study, the distribution of non-ethnic markets compared to bus stops reveals a significant pattern. Nearly all non-ethnic grocery stores are adjacent to at least one bus route, despite being spread across Lincoln. It is safe to assume that these developments are not an accident and that the transport engineers behind the bus routes considered access to food in their design. While this is certainly a positive finding, it is important to remember that long bus rides are still fairly inconvenient to grocery shoppers and this in no way addresses the food access problem completely.

Bike paths and trails are also fairly dense around ethnic markets in Lincoln, as shown by Figure 5. These trails and paths improve access for pedestrians, making it easier for people who need to walk to the grocery store to do so. One particular point of interest is the MoPac trail, which cuts across 27th street and offers access to all the ethnic grocery stores along the corridor. This trail is notable because it offers raised paths above busy streets, which make walking and biking along it much more comfortable. There does not appear to be the same connectivity between non-ethnic grocery stores and bike paths/trails as there was with bus stops, as most non-ethnic markets are disconnected from the trail system. This likely makes these grocery stores less accessible by foot and bike. Lastly, figure 8 shows that ethnic grocery stores tend to be located near and among census tracts with higher population densities than non-ethnic grocery stores. This may have strong implications for access, as more people are located nearer to these stores.

Where Are Ethnic and Non-Ethnic Grocery Stores Located in Relation to Minority and Low-Income Populations?

There are a number of illuminating figures concerning the populations ethnic grocery stores are centered around in Lincoln. Figures 9 & 10 show that ethnic grocery stores in Lincoln are also located near and among those tracts with higher numbers of people below the poverty line. These factors indicate that ethnic grocery stores may play a significant role in providing food access to low-income populations. Figure 10 goes into more detail, displaying a ¼ mile and ½ mile radial buffer analysis around the ethnic markets to approximate walkability. This figure shows that large portions of the most poverty-affected tracts are overlapped by walkability buffers from multiple ethnic grocery stores, offering options as well as access. Low-income populations are more likely to experience barriers to food access such as a lack of reliable personal transport. Having these grocery stores within walking distance, therefore, may fill an important gap for these communities. More sophisticated analysis tools would be able to better approximate walkability by including road networks and pedestrian infrastructure, but the radial distance used here provides a baseline visualization of the area these grocery stores are able to meaningfully affect.

Figure 11 further describes the impact ethnic grocery stores have in Lincoln, demonstrating that the census tracts in which these stores are located are among the most diverse in the city. The metric used for diversity is the US Census Diversity Index, which measures the probability that two people from a given census tract identify with different racial groups. This relationship is among the most clear of any in the study, showing that ethnic grocery stores likely serve a very diverse minority population. Likewise, non-ethnic grocery stores are shown to be located in areas with less racial diversity. This study does not presume to explain why this difference exists, but the information informs our understanding of which communities are served by these different types of grocery stores.

Figures 12 and 13 show how the location of certain categories of ethnic markets compares to the population they serve. Figure 12 shows Asian markets and Asian population and Figure 13 shows Hispanic markets and population. Some relationship between Asian population and Asian market location is visible, wherein relatively high Asian populations are located in the densest areas of Asian market concentrations. With that said, there are large populations on the outer eastern and northern sections of the city that are not served at all. A relationship between Hispanic markets and Hispanic population is even harder to define because of the lack of data points. A map was not made for Middle Eastern populations and markets because the available census data did not include a category for Middle Eastern racial divisions. The best approximation available was “Other Race” which would not yield useful results. Given these results it is difficult to say that ethnic markets are located nearer to the specific ethnicities they distinguish themselves as serving.

Overall, the findings of this study support the general consensus reached by Joassart-Marcelli and Martin et. al that ethnic grocery stores make important contributions to food access in the communities they serve. These contributions are a result of the food these stores provide and the communities in which they are located. Perhaps the most convincing argument on this point is to consider what the figures presented would look like if ethnic markets were removed from the study area. Glaring gaps in food access would exist in the areas with the most diversity, the highest population density, and the greatest number of people below the poverty line. In that spirit, it is important to notice the areas in Lincoln that are not served by grocery stores, ethnic or otherwise. There are still gaps in access, especially in northwest Lincoln, that require attention.

Conclusion

This study was conducted to analyze the impact of ethnic grocery stores on food accessibility in Lincoln, Nebraska. Food access has been shown to be an important factor in public health, one in which low-income and minority populations are more likely to experience challenges and barriers. A growing body of research has described ethnic markets as important sources of fresh, healthy food for vulnerable populations, but on the whole the contributions of ethnic markets are overlooked in policy and research. In addition, ethnic markets may face language and cultural barriers in civic participation processes, business licensing, and loan applications, reducing the structural support these businesses receive. For these reasons, understanding how ethnic markets affect food access in Lincoln has important implications for future food policy and research.

The study asked three main questions: how do ethnic grocery stores affect the availability of fresh fruit, fresh vegetables, dairy, and meat; where are ethnic grocery stores located in relation to non-ethnic grocery stores and transit services; and where are ethnic grocery stores located in relation to low-income, minority, and density demographics. In-person availability surveys revealed that 20 out of 21 stores stocked some amount of fresh vegetables, with 17 stocking 10 or more varieties. Fresh fruit was provided at 19 out of 21 stores, with 11 stores offering 10 or more varieties. 60% of stores stocked dairy products, and 100% of stores stocked meat. 20 out of 21 stores accepted EBT as a form of payment. Spatial analyses showed that ethnic markets were primarily concentrated along the 27th and O street corridors, whereas non-ethnic markets were more spread out over north, east, and southeast Lincoln. The areas where ethnic stores are primarily located tend to have denser concentrations of transit infrastructure including bus stops and bike paths. In addition, ethnic grocery stores tend to be located in and among census tracts with higher population densities, greater degrees of diversity, and larger populations below the poverty line.

The results of the survey indicate that ethnic grocery stores can be reliable sources of fresh produce, dairy and meat. This conclusion is corroborated by previous research conducted by Joassart-Marcelli and Short et. al. Nearly universal participation in EBT shows that ethnic grocery stores are able to serve SNAP-dependent populations. The proximity of ethnic grocery stores to bus stops, bike paths, and densely populated areas shows that these stores have the potential to improve access to healthy food for people who lack reliable personal transport.

Lastly, the proximity of ethnic grocery stores to highly diverse areas and large populations below the poverty line shows that ethnic grocery stores in Lincoln can improve food access for those populations that are most likely to face barriers to fresh, healthy food.

Future studies could include affordability measures in surveys of ethnic grocery stores such as the one conducted in the Joassart-Marcelli paper in order to better understand how valuable food products at these stores may be to low-income residents. A more sophisticated analysis of distance measures incorporating road networks and pedestrian infrastructure would provide a more in-depth look at how these stores affect access. Research exploring the barriers ethnic grocery stores face in Lincoln would be useful in informing policies designed to support their contributions to food access.

Reflecting on the process of conducting this study, the most useful piece of advice would be to be more mindful of the products of the research at the beginning. A considerable amount of time was spent on designing and implementing a survey that would not have produced meaningful results if it had not been stripped down and reformatted. This waste could have been avoided if the goals of the project had been more firmly defined in the beginning stages. Otherwise, all the general advice also applies as far as starting early, communicating often, and following through to the end.

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